4.5 MARINE AND NEAR-COASTAL BIOLOGICAL RESOURCES

This section describes marine and near coastal biological resources within the study area, presents significance criteria used to assess potential impacts of the Project on these resources, evaluates the Project's impacts, and recommends measures to mitigate potential significant adverse impacts. Separate subsections are provided on: (1) the sea cable route, including soft- and hard-bottom habitats and associated species, marine mammals and seabirds, sensitive habitats and species, and invasive species; and (2) landing areas, including invertebrates and plants/algae, fishes, marine mammals, seabirds and shorebirds, sensitive habitats and species, and invasive species.

4.5.1 Environmental Setting

Sea Route

The sea-based portion of the proposed cable route, extending in the marine environment from about 53-59 feet (16-18 m) depths at the proposed and alternative exit locations for horizontal directional drilling (HDD) to about 2,923 feet (891 m) depths, is located primarily in soft-bottom habitats typical of many near coastal and offshore areas in the project region (see Section 4.4 – Geology and Soils). Generally along the route, sandy substrate is present from at least 33-128 feet depth (10-39 m), changing to silty mud with fine grain sand from 131-194 feet (40-59 m), then increasing percentages of mud from 197-918 feet depth (60-280 m), although locally dense shell hash was observed at depths from 574-627 feet (175-191 m) and occasional rock outcrops were noted at depths from 295-456 feet (90-139 m) (MBARI 2004). Hard substrate, including scarps and some high-relief features (greater than 3 feet or 1 m), was more common at depths between 918-1,473 feet (280-449 m), although interspersed with deep soft-bottom habitat, and an eroded area was observed at 1,394 feet water depth (425 m). Mud bottom predominated below about 1,476 feet (450 m) to the maximum depth of the Project components. The soft-bottom areas are characterized by a diversity of habitats, primarily muddy (silt-clay) to sandy shelf and muddy slope environments, but also including areas of submarine canyons and the shelf break (Section 4.4 and Figure 4.5-1). Hard-bottom habitats are more limited in distribution and range from low- to high-relief rock and reefs, principally near the constricted "neck" leading to Smooth Ridge and shelf break areas, to isolated cobbles and boulders and stiff or hard clay along the cable route (Figures 2.1-2 and 4.5-1). Artificial hard substrate such as the Duke Energy outfall provides habitat for generally shallow water species, as described below. These differences in substrate and changes in depth directly influence the types of species and

Placeholder for Figure 4.5-1. Area of the Proposed Cable Route Where Hard-bottom Substrate Occurs, Based on ROV Video Observations.

biological communities that occur in the project region. Detailed information on bottom habitats, data on invertebrate and fish groups, and representative species typical of soft-bottom and hard-bottom habitats along the cable route are presented throughout this section and in Appendix G.

Most of the biological resources that occur commonly along the sea route are found throughout the central California region. This is particularly true at depths below about 656 ft (200 m), where many species tend to be relatively cosmopolitan in distribution along the California coast (SAIC and MEC 1989; Lissner et al. 1991). In contrast, hard-bottom habitats can be relatively limited in many California offshore regions (SAIC and MEC 1995). MBARI (2004), as reviewed independently by SAIC (A. Lissner) for this EIR/EIS, conducted the principal study that serves to characterize the bottom communities, including fish and invertebrates along the proposed cable route. Other regional studies and overviews include:

- NOAA (1992), corresponding to the EIS on the MBNMS;
- SAIC and MEC (1989), which characterized soft-bottom and hard-bottom habitats from 164-1,968 feet (50 to 600 m) depths off Eureka to the Monterey region, in support of Department of the Interior (Minerals Management Service [MMS]) studies for potential oil and gas development; and
- DOI (1978), representing large-scale summaries of biological and other resources in coastal and offshore regions of California north of Pt. Conception.

Over a thousand infaunal species and several hundred species of epifaunal invertebrates inhabit soft-substrate shelf and slope areas off central California (SAIC and MEC 1989; DOI 1978). This is contrasted by fewer number of fish species (less than 100) throughout the depth range for the cable route. Each of these groups of organisms is described separately by principal habitat type.

Kelp beds or eelgrass and associated biological communities do not occur along the cable route (53-2,923 feet; 16-891 m bottom depths) or proximity (Van Wagenen 2001; MBARI 2004) and are not addressed further in this section. The absence of these species is expected since the open coastal environment is too exposed for typical eelgrass habitat (more sheltered bays and estuaries) and the shallowest cable depth is much deeper than eelgrass commonly occurs (less than about 16 feet; 5 m). Similarly, within the typical depth range for kelp (less than 98 feet; 30 m), the soft-bottom substrate along the route does not provide suitable habitat for attachment. Sparse algae was observed attached to infrequent cobbles and pebbles at shallow depths (less than 98 ft or 30 m), but generally did not comprise more than an incidental occurrence.

Soft-Bottom Habitats

Infauna

Infaunal species collected in soft-bottom habitats, representing the principal substrate type where full cable burial is feasible, were characterized during recent studies conducted by MBARI (2004) using Smith-McIntyre grabs and push cores from a remotely operated vehicle (ROV). These studies documented polychaete worms as the infaunal group with the highest abundance (Appendix G, Table G-1) and species (taxa) richness (Appendix G, Table G-2) at most depths. The most abundant polychaetes (by depth) included *Magelona hartmanae, M. sacculata*, and *Scoletoma luti* (82 ft; 25 m); *Chaetozone lunula, Aricidea* (*Acmira*) *catherinae*, and *Mediomastus* spp. (144 ft; 44 m); *A. catherinae* (154 ft; 47 m); *Sternaspis* nr. *fossor* (197 ft; 60 m); *Mediomastus* spp., and *Spiophanes berkeleyorum* (295 ft; 90 m); *Sphaerosyllis ranunculus* (1,066 ft; 325 m), *Onuphidae* spp., *Protodorvillea gracilis,* and *S. ranunculus* (1,476 ft; 450 m); and *Cossura pygodactylata* (2,903 ft; 885 m), as summarized in Appendix G, Table G-3. Oligochaete worms predominated at the 885-m station.

Gammarid amphipods were relatively abundant (one of the top five most abundant taxonomic groups) at all stations, and were the most abundant and/or species rich group at several deeper stations (Table G-1). The most abundant gammarids (by depth) included *Ampelisca unsocalae, Lepidepecreum serraculum*, and *Tiron biocellata* (2,099 ft; 640 m); *A. unsocalae, Photis typhlops*, and *Byblis barbarensis* (2,526 ft; 770 m); and *L. serraculum* and *A. unsocalae* (2,608 ft; 795 m), as summarized in Table G-3. Gammarids were the most species rich group at 2,100- and 2,526-feet depths (640- and 770-m) (Tables G-2 and G-3).

Other relatively abundant infaunal invertebrates included bivalves (144, 154, 197, 295, 2,100 ft; 44, 47, 60, 90, 640 m), nemertean worms (144, 154 ft; 44, 47 m), ostracods (144, 154, 1,066 ft or 44, 47, 325 m), and ophiuroids (197, 295, 1,476 ft; 60, 90, 450 m) (Table G-1). Caprellid amphipods, e.g., *Tritella tenuissima*, and tanaids were abundant at the 325- and 450-m stations. Species richness for gastropods and ophiuroids was relatively high at the 60-, 90-, and 325-m stations, and additionally for ophiuroids at 1,476 ft (450 m) (Table G-2). Isopods and tanaids had high species richness at 1,066 ft (325 m).

Epifauna

ROV studies conducted by MBARI (2004) documented gastropods as the most abundant group on the sand substrate that occurs from 82-128 feet depths (25-39 m), in addition to sparse sea pens, and seastars (MBARI 2004 and Appendix G, Tables G-4 to

G-6). Between 131-194 feet (40-59 m), the substrate was silty mud with fine grain sand that was typified by cerianthaid anemones, the seastar *Luidia foliolata*, and the seapen *Stylatula elongata*. From 197-456 feet (60-139 m), abundant species included the seastar *Rathbunaster californicus* and the seapens *Ptilosarcus gurneyi* and *Pennatula* sp. Areas of deep sediment that were adjacent to hard substrate habitats (see below) near 295-456 feet (90-139 m) and 918-1,473 feet (280-449 m) were characterized by the sea urchin *Allocentrotus fragilis*, sea cucumber *Parastichopus leukothele*, and *R. californicus*. At 459-656 feet water depth (140- to 200-m), *R. californicus* was the dominant organism in a habitat typified by dense shell hash. Between 1,476-1,965 feet (450-599 m), the seapen *Halipteris californica* was the dominant organism. This trend continued at depths over 1,969 feet (600 m) with seapens (*H. californica* and *Umbellula magniflora*) predominating, while the Tanner crab *Chionoecetes tanneri*, gastropods, and mesomyarian anemones were very common.

Overall trends in epifaunal distribution based on analysis of ROV data from 820-5,494 feet water depths (250-1675 m) indicated that seapens (Pennatulacea) were the most abundant and species rich group along the cable route (Table G-6). A dense assemblage of *H. californica* was present at 2,903 feet (885 m), and was also very abundant at the 2,099 feet (640 m) and 2,608 feet (795 m) stations. *Umbellula magniflora* was very abundant at stations from 2,100 to 2,904 feet (640 to 885 m). Other relatively abundant organisms (top five most abundant taxa) included gastropods (144, 154, and 1,476 ft; 44, 47, and 450 m), ceriantharids (154, 1,476, and 2,100 ft; 47, 450, and 640 m), *R. californicus* and *A. fragilis* (1,066 ft; 325 m), the anemone *Liponema brevicornis* (1,476 feet; 450 m), *C. tanneri* (640, 795 m), and the holothurian *Pannychia moseleyi* (2,904 feet; 885 m). Anemones were observed at most stations as were crabs (Brachyura) and seastars. The highest epifaunal abundance, mostly represented by seapens, was at the 325- and 885-m stations. Species richness was highest at mid depths, particularly the 325-m station.

<u>Fishes</u>

Soft-bottom habitats on the upper and middle slope (water depths from approximately 656 to about 3,281 ft; 200 to about 1,000 m) are characterized by moderate numbers of fish species, including flatfishes such as Dover sole, *Microstomas pacificus* and California halibut, *Paralichthys californicus*, rockfishes (*Sebastes* spp.), Pacific hake, *Merluccius productus*, sablefish, *Anoplopoma fimbria*, and skates. Fish densities along the route are moderate, while biomass is generally variable (moderate to high) (USEPA 1993; see also Section 4.2 [Commercial and Recreational Fisheries]). Recent ROV surveys along the cable route by MBARI in 2003 (MBARI 2004) found, due to poor visibility, that none of the fishes at the 44 m station were identifiable to species.

Pleuronectiformes (unidentifiable flatfish) were found at all stations (Appendix G; Tables G-4 through Table G-6). *Sebastes jordani* and some flatfishes (Bothidae) were present in high numbers in shallow areas (154-295 ft; 47-90 m). Zoarcids were represented at all stations from 1,066 to 2,904 feet (325 to 885 m), while hake and Dover sole were present in high abundance at deeper depths (1,476-1,965 ft; 450-599 m). At depths over 1,968 feet (600 m), the rockfish *Sebastolobus* was very common (Appendix G; Table G-6). Hagfish (Myxinidae) were consistently present from 1,476 to 2,904 feet (450 to 885 m).

Similar species composition was observed during camera sled and trawl surveys (Wakefield 1990) of deep habitats (0.62 miles; 1 km) off central California (Pt. Sur), including black hagfish, *Eptatretus deani*, cat sharks (*Apristurus* spp.), skates (*Bathyraja* spp.), sablefishes, and Dover sole. Most of these species are found over soft-bottom habitats where the cable would be buried. These groups are characteristic of fish communities at those depth ranges along the entire route. For example, shallow water areas (236 to 279 ft water depth; 72 to 85 m water depth) were typified by sanddabs (*Citharichthys* spp.), rex sole, *Errex zachirus*, English sole, *Pleuronectes vetulus*, and pink surfperch, *Zalembius rosaceus* in all studies at these depths along the California coast from San Francisco to San Diego. Densities of these species groups vary, but are generally moderate to high (1,500-2,500 individuals per hectare), while biomass is typically low. At depths from 420-1,657 feet (128-505 m), the most common species include a wide variety of rockfishes such as shortbelly rockfish, *Sebastes jordani*; flatfishes such as dover, rex, and English sole; sablefish; and some skates (*Raja* and *Bathyraja*).

<u>Invasive Species</u>

Invasive (alien) species documented in the MBNMS are listed on the Elkhorn Slough National Estuarine Research Reserve website (www.elkhornslough.org/invader.htm). The vast majority of the reported marine species are from the Slough, with only nine reported from marine habitats (intertidal and harbor areas). Future studies are expected to identify additional marine species. However, all of presently identified species occur primarily if not exclusively on hard substrates, so they would not be expected in soft-bottom habitats or, for species such as the brown alga *Undaria pinnatifida*, at depths greater than the shallowest areas along the sea route (about 50 feet). Thus, invasive species are unlikely to occur along soft-bottom areas of the sea route. Potential impacts from the introduction of alien species by the release of ballast waters from the cable-laying vessel and any support vessels would be reduced or avoided through the implementation the Ballast Water Management Plan presented in the Application. Vessels entering near shore areas of the United States after ballasting in foreign waters would be required to exchange water while in offshore areas to minimize the potential for the introduction of alien species.

Hard-Bottom Habitats

Functionally, hard-bottom habitats represent areas where the cable either: (1) cannot be buried due to the occurrence of rocky substrate that is too hard or high relief for plowing, (2) should not be buried due to the presence of sensitive species, large, slow-growing sponges, or (3) should not be buried due to semi-permanent trench mounds that would be created in some stiff to hard clays or sandstone/mudstone. Fugro (2004) concluded that no burial to limited burial would be feasible along nearly 18 percent of the route (8.9 of 51 km), while only partial burial would be possible along an additional 6 percent of the route (3.1 of 51 km). Based on MBARI (2004), rock outcrops occur occasionally from 295-456 feet (90-139 m) along the cable route and more frequently between 918-1,473 feet (280-449 m). The substrate surface appeared eroded at around 1295 feet (425 m). MBARI (2004) estimated that the predominantly rocky substrate areas comprise about 10 percent (3.2 miles; 5.2 km) of the route, and include three scarp areas that are over 3.3 feet (1 m) in height. These scarps are defined as high-relief substrate, based on standard definitions used since at least the 1980s by the Department of the Interior, Minerals Management Service, as part of extensive hard-bottom studies and impact assessments off central and southern California (SAIC and MEC 1989; Lissner et al. 1991). High-relief substrate is significant because of the relatively more common occurrence of some invertebrates and fish species that are sensitive to disturbance from cable and pipeline installations.

<u>Epifauna</u>

Common epifaunal invertebrates occurring in hard-bottom habitats typically vary based on depth and substrate relief height (Lissner and Benech 1993). There is a strong similarity in many of these communities at the same depth and substrate type along much of the California coast (SAIC and MEC 1995). Shelf (98 to 492 ft; 30 to 150 m) communities commonly include cup corals, e.g., *Paracyathus* and *Balanophyllia*, hydroids, encrusting sponges, ascidians, gorgonians, anemones, e.g., *Metridium* and *Urticina*, and ophiuroids. Middle to upper slope (492 to 984 ft; 150 to 300 m) communities are typified by a variety of erect sponges, anemones, *Stomphia, Amphianthus*, and *Metridium*, decapods, ophiuroids, and asteroids. Deeper communities (984 to 3,281 ft; 300 to 1,000 m) are often represented by a greater diversity and size of many sponges and echinoderms in particular. Other species, including several echinoderms (*Florometra, Gorgonocephalus*, and *Allocentrotus*), exhibit a broad depth range (328-1,640 feet; 100-500 m or more).

Epifaunal species that are more common in high relief areas can include suspension feeding cnidarians such as the branching coral *Lophelia*, the hydrozoan *Allopora*, several cup corals, and a variety of anemones and zoanthids, erect sponges, the crinoid *Florometra*; the basket star (*Gorgonocephalus*); and bryozoans. In contrast, low relief areas (less than about 3.3 ft or 1 m) have far fewer species, are largely influenced by episodic sediment burial and higher suspended particle loads, and include the anemone *Metridium*, cup corals, and ophiuroids.

MBARI (2004) noted that the predominant species occurring exclusively on hard substrate along the cable route were encrusting and vase sponges; the anemone *Metridium farcimen*; small, unidentified anemones; the alcyonacean (soft coral) *Anthomastus ritteri;* brachiopods (*Laqueus californianus)*; crinoids (*Florometra serratissima)*; gorgonians; basket stars (*Gorgonocephalus eucnemis)*; and sea cucumbers (*Psolus squamata)* (Tables G-4 to G-6). Sponges were observed on hard substrate from about 295 to 1,476 feet (90 to 450 m), although the shallower depth occurrences were predominantly small (several cm diameter), yellow-colored specimens that opportunistically occupied small pebbles or cobble in an otherwise soft-bottom habitat (personal communication, L. Kuntz 2004). Somewhat larger vase or barrel sponges occurred even less frequently in similar habitats.

Fishes

Hard bottom areas along the cable route, i.e., rock ledges and/or outcrops, are dominated by rockfishes (*Sebastes* spp.) (SAIC and MEC 1989; MMS 1995; SAIC and MEC 1995). Other species observed near rock outcrops along the route included Pacific whiting (*Merluccius productus*), while thornyheads (*Sebastolobus* spp.) can be found in the vicinity of these features (MBARI 2004).

Invasive Species

As noted for soft-bottom habitats, invasive (alien) species documented in the MBNMS are listed on the Elkhorn Slough National Estuarine Research Reserve website (www.elkhornslough.org/invader.htm). The nine species from marine habitats (intertidal and harbor areas) occur primarily if not exclusively on hard substrates. However, since the shallowest areas of significant hard substrate along the sea route begin at about 274-424 feet (90-139 m) (MBARI 2004), these animal species are not expected to occur at these depths and no algae would occur.

Essential Fish Habitat

The Project is located within an area designated as EFH for three FMPs, including Pacific Coast Groundfish (PFMC 1998a), Pacific Salmon (PFMC 1999), and Coastal Pelagics (PFMC 1998b). Detailed information on Essential Fish Habitat (EFH) is presented in Appendix D.1. As described in Appendix D.1, many of the managed groundfish species along the California coast (PFMC 1998a) occur in the project area. Similarly, managed salmon species (coho, chinook, and pink) from PFMC (1999) are also present in the study area. For coastal pelagics, five species, including northern anchovy, jack mackerel, Pacific sardine, Pacific (chub) mackerel, and market squid managed under this FMP can be found in high abundances in the study area.

Information on the potential impacts of the Project on EFH and managed fish and invertebrate species under each Fishery Management Plan (FMP) is presented below in Section 4.5.4 and also in Appendix D.1.

Marine Mammals

The MBNMS has one of the most diverse and abundant assemblages of marine mammals in the world. This rich marine mammal fauna is a result of several factors, including the great productivity of Sanctuary waters due to upwelling, the Sanctuary's central location between tropical and Arctic environments, the diversity of habitats, and the Monterey submarine canyon, in which deep water occurs near the coast (Harvey 1998). Table 4.5-2 shows the relative abundance of marine mammals along the inshore (S-1), middle (S-2), and offshore (S-3) portions of the cable route for each season of the year. Species such as Pacific harbor seal (*Phoca vitulina richardsi*), Dall's porpoise (*Phocoenoides dalli*), harbor porpoise (*Phoecoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), and southern sea otter (*Enhydra lutris*) are resident in the Sanctuary, while other species such as the California gray whale (*Eschrichtius robustus*) migrate through the area (Harvey 2004). Other species such as humpback (*Megaptera novaeangliae*), blue (*Balaenoptera musculus*), and fin (*Balaenoptera physalus*) whales are present seasonally. With the exception of the gray whale, the large whales are generally most abundant in the Sanctuary during late summer and fall (July-November). Gray whales migrate southward through the Monterey area from December to mid-February and northward from mid-February through May. Although most of the dolphins are present in the project area year-round, they typically are less abundant during the cold upwelling period of February through July (Harvey 2004).

Orcinus orca (killer whale) is the top predator in Monterey Bay, moving in well-organized packs and feeding on a wide variety of prey, including large baleen whales, fish, and

Placeholder for Figure 4.5-2. Expected Seasonal Occurrences of Marine Mammal Species Along the Cable-Laying Path of the MBARI Project

sea lions. Black et al. (1996) identified over 180 individual whales in Monterey Bay, with some being re-sighted as far north as Alaska and as far south as Mexico. These "transient" whales seem to follow the migrating gray whales or other large baleen whales. Research on orcas in the Pacific Northwest has documented separate populations of "transient" and "resident" whales and, while there are some structural differences, most of the characters that separate these two "types" are behavioral (Heyning & Dahlheim 1993).

Baird's beaked whale (*Berardius bairdii*) is the largest of the beaked whales, and can grow up to 40 feet long and travel in pods of up to 20 animals, with the adults being often heavily scarred. These whales are found annually in Monterey Bay, usually in summer and fall. Although little is known about their life history, they apparently eat squid, deep-sea fishes, and crustaceans. They can dive for up to 40 minutes.

The most abundant marine mammals in the S-1 area (first 18-km section of cable) are harbor seals, California sea lions (*Zalophus californianus*), bottlenose dolphins, harbor porpoises, and southern sea otter (Harvey 2004). The most abundant marine mammals in the middle cable segment (S-2) are harbor seal, California sea lion, gray whale (winter), humpback whale (August to November), blue whale (August to November), Risso's dolphin (*Grampus griseus*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens),* northern right whale dolphin *(Lissodelphis borealis*), and Dall's porpoise. The species most abundant in the final segment of cable (S-3) include California sea lion, humpback whale (August to November), California gray whale (December to March), Risso's dolphin, Pacific white-sided dolphin, northern right whale dolphin, and Dall's porpoise (Figure 4.5-2, Harvey 2004).

Several species of marine mammals that could occur along the cable route are listed as threatened or endangered. These are discussed in more detail in the sensitive species section below.

Seabirds

The same factors that make the Sanctuary such a rich habitat for marine mammals also make it an extremely productive habitat for seabirds. The waters of the Sanctuary are among the most heavily utilized by seabirds in the world (Ainley and Terrell 1998). Ninety-four (94) species of seabirds are known to occur regularly within and in the vicinity of the Sanctuary (Ainley and Terrill 1998). Water depth and distance to the shelf-slope break are factors most critical to determining habitat use by these species. Most seabirds are seasonal residents. They winter in Sanctuary waters and exploit the rich food resources supported by upwelling (Ainley and Terrill 1998).

The offshore portion of the proposed cable route lies along the continental shelf break. Seabird densities in this area are substantial (Ainley and Terrill 1998). Abundant seabirds in this area include sooty shearwaters (*Puffinus griseus*) during spring and summer, and fulmars and gulls during winter (Ainley and Terrill 1998). Other characteristic species in this area include pink-footed (*P. creatopus*) and Buller's (*P. bulleri*) shearwaters, black storm petrels (*Oceanodroma melania*), and rhinoceros auklets (*Cerorhinica monocerata*). Inshore of slope waters in the middle and inshore portions of the cable route, dominant seabirds include sooty shearwaters, western grebes (*Aechmophorus occidentalis*), Pacific loons (*Gavia pacifica*), California brown pelicans (*Pelecanus occidentalis*), Brandt's (*Phelacrocorax pencillatus*) and pelagic cormorants (*P. pelagicus*), and common murres (*Uria aalge)*.

Seabirds that breed in the Sanctuary include pelagic and double-crested cormorants (*P. auritus),* western gulls (*Larus occidentalis*), Caspian terns (*Sterna caspia*), pigeon guillemots (*Cepphus columba*), rhinoceros auklets, and marbled murrelets (*Brachyramphus marmoratus*) (Ainley and Terrill 1998). However, little breeding habitat exists in the Sanctuary and most local breeders nest in small numbers. The one exception is Brandt's cormorant that nests in relatively large numbers in Monterey.

Sensitive Habitats and Species

As discussed under the soft-bottom habitats section above, no relevant sensitive plant habitats, such as kelp or eelgrass, occur along the offshore sea route, primarily because of the deep-water depths greater than 90 feet (~30 m) and unsuitable substrate and/or exposure conditions.

No environmentally sensitive and marine protected areas occur along or near the cable route. There are several marine protected areas within the Sanctuary that are located outside the general project area and are not in the vicinity of the cable route. These include the California Sea Otter Game Refuge, Carmel Bay Ecological Reserve, Hopkins Marine Life Refuge, and the Pacific Grove Marine Gardens Fish Refuge. These areas are not addressed further in this document since they are located many miles from the cable route and therefore would be unaffected by project activities.

Several listed species of marine mammals may occur along the proposed cable route. Six species of federally endangered whales occur seasonally in the project area. These species are blue whale, fin whale, sei whale (*Balenoptera borealis*), humpback whale, Pacific right whale (*Eubalaena glacialis),* and sperm whale (*Physeter macrocephalus*).

Several hundred blue whales visit the Sanctuary annually to feed on krill (Hall and Kum 2001). Blue whales are highly mobile and are thought to move regularly between

Monterey and other feeding grounds, such as Cordell Bank and the Channel Islands regions. Blue whales may be present in the Sanctuary for variable periods during May through October. The most recent estimate for the blue whale population off the western coast of the United States is 1,480 whales (Carretta et al. 2004).

Between 50 and several hundred fin whales have been known to visit the Sanctuary annually between April and September (Hall and Kum 2001). They commonly feed on krill associated with upwelling at the boundaries of offshore currents. Current estimates for the California through Washington population of fin whales is 3,279 animals (Carretta et al. 2004).

Sei whales are rare in California waters (Bonnell and Dailey 1993) and can be difficult to identify at sea. A recent estimate for California, Oregon, and Washington waters based on 1996 and 2001 shipboard surveys is 56 whales (Caretta et al. 2004).

Humpback whales are known to commonly occur in the Sanctuary (Harvey 1998) between May and October (Hall and Kum 2001). The most recent minimum population estimate for the California/Mexico stock is 681 animals (Carretta et al. 2004).

The northern Pacific right whale is one of the rarest marine mammals in the world (Hall and Kum 2001). There are no reliable estimates of right whale abundance; however, the population is larger than once believed. The three most recent sightings of this species south of Alaska occurred within the Sanctuary (Hall and Kum 2001).

Sperm whales are the deepest diving marine mammal. The area where sperm whales are most frequently sighted in the Monterey region is around Davidson Seamount, outside the Sanctuary boundaries and beyond the project area (Hall and Kum 2001). The most recent abundance estimate for sperm whales in the waters from California to Washington is 1,233 whales (Carretta et al. 2004).

Two listed pinniped species occur in the Sanctuary, the Federal threatened Stellar sea lion (*Eumetopias jubatus*) and the Federal and State threatened Guadalupe fur seal (*Arctocephalus townsendi*).

Año Nuevo Island is the southernmost breeding area for the Stellar sea lion; they are rarely seen at other haul-out sites in the Sanctuary (Harvey 1998). Although some females are present on Año Nuevo Island all year, an influx occurs in late May and June, with peak numbers in July and August (Orr and Helm 1989).

Guadalupe fur seals occur infrequently in the Sanctuary (Harvey 1998). This species breeds on Guadalupe Island off Mexico (Bonnell and Dailey 1993).

The Federal threatened southern sea otter may occur along the shallower portions of the proposed cable route. Sea otters are uncommon in offshore areas and are primarily found in water depths less than about 100 feet (30 m) because of their close association with kelp beds in many nearshore areas. Sea otters are mainly distributed along the coast south of Pt. Año Nuevo to Pt. Conception (Bonnell et al. 1983). Southern sea otters are descended from a small colony discovered off the Big Sur coast in 1938 (USFWS 2003). The 2004 count for the southern sea otter is 2,825 animals (USGS 2004). Approximately 19 percent of the population occurs in the Monterey Bay area between Capitola and Point Lobos.

Sensitive seabird species that may occur along the proposed cable route include the State and Federal endangered California brown pelican, the California least tern (*Sterna antillarum brownii),* and the Federal threatened marbled murrelet (*Brachyrampus marmoratus*). The California brown pelican disperses to the Monterey area from its breeding colonies on southern California and Mexican islands; it is fairly common in Sanctuary waters. The California least tern does not nest in Monterey Bay but may forage in the area during migration. Marbled murrelets nest on branches of old growth coniferous trees from the coast up to 60 miles inland in forested areas adjacent to the northern portion of the Sanctuary from Santa Cruz north (Carter et al. 1992). The marbled murrelet population in the Sanctuary is the most disjunct and most precarious breeding population of this species and the most distant from other breeding populations (Ainley and Terrill 1998).

Landing Area

The landing area for the Project is defined as nearshore and beach areas from the shoreline to about 53-59 feet depth (16-18 m), corresponding to the HDD exit points and habitats under which the drilling would occur (Sections 2 and 3). The drilling entry and exit points could be subjected to direct disturbance from drilling, and the intervening habitats could be affected by drilling fluid losses, if any, from fractures in the geologic formation.

Invertebrates and Plants/Algae

The landing area habitats are characterized by sandy substrates and associated invertebrate and fish species that are typical of the Monterey region (NOAA 1992). Common sandy beach invertebrates at the landing site should include polychaete worms, crustaceans (isopods and amphipods), and molluscs (snails and bivalves). Habitats between 33-79 feet (10-24 m) were characterized by MBARI (2004) as having patchy accumulations of algae (browns, greens, and reds), and occasional *Cancer* crabs and polychaete worms, such as *Diopatra*.

Fishes

Fishes occupying nearshore subtidal habitats near the landing site include pelagic schooling species such as northern anchovy, Pacific herring, and sardines and some demersal fishes, including flatfishes (sanddabs, sand sole, and starry flounder) and surfperch. Sandy areas can be used for spawning by smaller pelagic fish species such as grunion and smelt.

Invasive Species

As noted for the sea route, invasive (alien) species documented in the MBNMS are listed on the Elkhorn Slough National Estuarine Research Reserve website (www.elkhornslough.org/invader.htm). The nine species from marine habitats (intertidal and harbor areas) occur primarily if not exclusively on hard substrates. However, since these habitats would be avoided by HDD activities at the landing site no invasive species should be encountered. To minimize the potential for the introduction of alien species from the release of ballast waters the Applicant would implement the Ballast Water Management Plan.

Essential Fish Habitat

An overview of the essential fish habitat assessment is presented above under the Sea Route section; detailed information on EFH is presented in Appendix D.1.

Marine Mammals

Common marine mammals in nearshore waters in the vicinity of the proposed cable landing site are harbor seals, California sea lions, bottlenose dolphins, and southern sea otters (Harvey 1998). There are no major pinniped haul-out sites along the open coast beaches in the vicinity of the proposed landing site. Southern sea otters and harbor seals are common within Elkhorn Slough where there are important harbor seal pupping and haul-out sites (Harvey 1998).

Seabirds and Shorebirds

Abundant seabirds close to shore include western grebes, Pacific loons, California brown pelicans, cormorants, gulls, surf (*Melanitta perspicillata*) and white-winged (*M. fusca*) scoters, and marbled murrelets (Ainley and Terrill 1998). Elkhorn Slough provides valuable habitat for seabirds and waterfowl. Horned (*Podiceps auritus*) and eared grebes (*P. nigricollis*), American coots (*Fulca americana*) and a variety of ducks dominate the waterfowl assemblage of Elkhorn Slough (Ainley and Terrill 1998). Common ducks in the slough include common goldeneyes (*Bucephala clangula*), buffleheads (*Bucephalia albeola*), northern pintails (*anas acuta)*, mallards (*Anas platyrhynchos*), and cinnamon teal (*Anas cyanoptera*). Elkhorn Slough also supports a Caspian tern (*Sterna caspia*) breeding colony. Waterfowl that breed in Elkhorn Slough include American coots, mallards, northern pintail, and cinnamon teal. Egrets and herons nest in trees surrounding the Slough.

A variety of shorebirds are present in Elkhorn Slough and on open coast beaches in the project area. Elkhorn Slough attracts the third largest concentration of shorebirds in California; only the much larger San Francisco and Humboldt Bays support larger shorebird populations (Ainley and Terrill 1998). Dominant shorebird species in Elkhorn Slough include least (*Calidris minutilla*) and western (*C. mauri*) sandpipers, dunlins (*Calidris alpine*), sanderlings (*Calidris alba*), short (*Limnodromus griseus*) and long-billed (*L. scolopaceus*) dowithchers, black-bellied plover (*Pluvialis squatarola*), willet (*Catoptrophorus semipalmatus*), American avocet (*Recurvirostra Americana*), marbled godwit (*Limosa fedoa*) and long-billed curlew (*Numenius madagascariensis*) (Ainley and Terrill 1998). Sanderlings, willets, and marbled godwits are the species most commonly observed feeding along open coast beaches in the project area. Shorebirds reach their greatest densities in the project area between October and March (Ainley and Terrill 1998). The seasonal peak reflects migrants moving to and from northern breeding grounds as well as large numbers of overwintering birds. Shorebirds that breed locally in the Sanctuary include American avocet, black-necked stilt, killdeer (*Charadrius vocifeus*), and the Federal threatened western snowy plover (*Charadrius alexandrinus nivosus*).

Sensitive Habitats and Species

The only sensitive marine mammal likely to occur in the vicinity of the landing site is the Federal threatened southern sea otter. While sea otters occur along the cable route, they are more common inshore than offshore and also are abundant in Elkhorn Slough.

Sensitive seabird species that may occur in the coastal waters in the vicinity of the landing area include the State and Federal endangered California brown pelican, the State and Federal endangered California least tern, and the Federal threatened marbled murrelet. These species were discussed above under sensitive species that occur along the cable route. Brown pelicans and least terns also visit Elkhorn Slough. The old salt ponds in the Moss Landing Wildlife Area are a major roosting site for brown pelicans.

The Federal threatened western snowy plover nests on beaches in the vicinity of the landing site and also in Elkhorn Slough, primarily in the salt ponds in Moss Landing

Wildlife Area. The western subspecies of snowy plover was listed as threatened by the U.S. Fish and Wildlife Service in 1993 due to loss of nesting habitat and declines in breeding and wintering populations (USFWS 1993). In 1999, the U.S. Fish and Wildlife Service designated critical habitat for the western snowy plover (Miller et al. 1999). All of the beaches in the project area including Zmudowski Beach, Moss Landing Beach, and Salinas River State Beach, are designated as critical habitat for nesting and wintering. Elkhorn Slough mud flat/salt pond habitat in Moss Landing Wildlife Area was also listed as Critical Habitat for nesting and wintering. The breeding season for snowy plovers extends from early March to late September (Miller et al. 1999).

4.5.2 Regulatory Setting

Federal

Federal agencies and permitting related to marine biological resources include a Research Permit from the MBNMS, Letters of Concurrence from the U.S. Fish and Wildlife and NOAA Fisheries under Section 7 of the Endangered Species Act (ESA); and a NOAA Fisheries Letter of Concurrence related to Essential Fish Habitat assessment.

State

State permitting needs will include a Letter of Concurrence from the California Department of Fish and Game under Section 2090 related to interagency consultation, and potentially Section 2081 of the California ESA, for potential effects to marine biological resources.

Local

Local permits and approvals related to marine biological resources are not required.

4.5.3 Significance Criteria

An impact on marine and near-coastal biological resources is considered significant if any of the following apply:

- Any substantial loss or degradation to the functional habitat value of any area of biological significance that cannot recover within 1 year of project completion;
- Any substantial impedance of fish or wildlife migration or passage routes that lasts for more than 48 hours;
- Any substantial alteration or destruction of habitat that prevents reestablishment of biologically significant communities that inhabited the area prior to the project;

- Extensive alteration or loss of biological communities in high-quality habitat, such as high-relief hard bottom and areas with colonial corals and large sponges, that lasts longer than 1 year; or
- Any substantial loss or disturbance of a population of a threatened, endangered, or candidate species or its habitat, for example, by substantial reduction of numbers, alteration in behavior, reproduction, or survival, or loss or disturbance of habitat.

4.5.4 Impact Analysis and Mitigation

Sea Route

Summary

The Project (cable installation, operation, repairs, and decommissioning) would cause less than significant localized and temporary impacts, such as burial, crushing, and/or displacement to invertebrates and fishes in soft-bottom habitats along the cable route. Potentially longer term and more substantial impacts could occur to species in hard-bottom habitats, but the disturbance would still be localized and less than significant. These differences in habitats and potential impacts generally correspond to areas where the cable is proposed for full burial to a depth of 3.3 feet (1 meter) along over 76 percent of the route (39 of 51 km) versus areas where burial is infeasible or may not be advisable, such as full, no, or partial burial listed in Fugro 2004. Infeasible (no burial) areas correspond to stiff to hard clay and rock substrate along nearly 18 percent of the route (9 of 51 km) where substantial damage to the environment and cable-laying equipment could occur if burial was attempted. Potentially inadvisable (partial burial) areas equate to very low to no-relief hard-bottom habitats where the substrate is comprised of clay over dense sand or weakly cemented material along 6 percent of the route (3 of 51 km). Plowing in these habitats could result in the creation of “sidecast berms” that may range from several inches to nearly three feet (~1 meter) in height on both sides of the burial trench. This potential outcome is based on results from the Global West cable project off California that achieved partial burial in similar low to no-relief hard substrate, but created large sidecast berms (personal observation, Heilprin and Lissner 2000). For the MARS project, these types of substrate may equate to the partial burial areas noted above. The sidecast berms would create a somewhat different type of habitat, comprising higher relief and structure (complexity) than the natural bottom type, although it is unlikely this would represent a significant impact. Increases in habitat relief and structure can be associated with increases in species abundance and diversity, such as evidenced by changes due to artificial reefs. Community changes due to the relatively small-scale differences that would result from sidecast berms cannot be accurately predicted. Since certain types of commercial fishing (trawling) can cause impacts on hard bottom habitat and benthic resources, organisms in hard bottom areas along the cable route likely already have been impacted.

Invertebrates, Fishes, and Plants/Algae

Impact MBR-1: Damage to Soft-Bottom and Hard-Bottom Organisms and Habitat

During the pre-lay grapnel run, cable installation, post-lay burial, and decommissioning the substrate and fragile organisms could be dislodged or crushed. (Class III)

The Project could affect soft-bottom and hard-bottom biological resources as a result of the pre-lay grapnel run, cable installation by plowing, any post-lay burial that is required, and the long-term, e.g., 25 years, presence of the cable in these habitats. Similar impacts could occur during cable removal activities. These potential impacts could include dislodgment and/or crushing of the substrate or fragile organisms by the grapnel, while the cable is being buried or surface laid on the bottom, and during cable removal. Impacts from the post-lay presence of the cable would be similar if there was substantial movement of the cable (strumming) that caused abrasion, and dislodgment/crushing of the organisms or substrate. However, many potential impacts would be avoided or minimized by use of the construction or decommissioning methods and procedures specified in Section 2.2, as noted below for particular types of habitats.

Some impacts, such as burial, crushing, and/or displacement would occur on invertebrates in both hard-bottom and soft-bottom areas as a result of grapnel, cable-laying, and cable removal activities. The significance of the impacts depends on the relative area of disturbance compared to the overall habitat and community, either locally or regionally, and the type of species. In general, significant impacts on soft-bottom species and habitats are not expected because of the localized nature of the disturbance (cable plow width for installation and a likely smaller width for removal) compared to the very large areas of undisturbed habitat in the project region, and because recolonization and recovery would likely occur within a year or less. However, greater impacts could occur to hard-bottom habitat and communities, particularly species that are relatively sensitive to disturbance.

Impacts on Hard-bottom Habitats

"Sensitive" species of hard-bottom organisms are defined for the purposes of this Project based on the type of potential impacts. The most likely species experiencing impacts would be those having each of the following characteristics:

- Attached to the substrate;
- Relatively large (greater than several inches in height and approximately greater than 0.3 m^2 in areal extent); and
- Generally rigid body type (susceptible to breakage from contact by cable-related activities).

Over the depth ranges of the Project, these types of species generally would correspond to large erect sponges, where they occur directly along the route. In contrast, communities typified by species that are relatively mobile (sea stars), low profile (cup corals and hydroids), or flexible (anemones) would be much less susceptible to cable impacts and are not considered sensitive in this analysis. Based on the MBARI (2004) data that closely documented route areas characterized by hard-bottom communities, the localized nature of the potential disturbance in these habitats (generally a maximum of tenths of a meter wide during cable laying) coupled with installation methods that will avoid bottom contact by grapnels and the plow in hard-bottom areas (Section 2.2), significant impacts are unlikely. Further, none of these species is recognized as biologically significant in Federal, State, or local policies, statutes, or regulations. The predominant (non-sensitive) species in these habitats are mostly very low profile (1 inch or less) and/or sturdy species such as encrusting forms, or are relatively mobile to highly mobile, such as seastars, sea cucumbers, and fishes. Cable laying on these species would have only a temporary and localized scale of disturbance as noted, and would be inconsequential given the common occurrence of these species throughout these habitats.

Careful installation and post-lay inspection/adjustment of the cable, particularly in high-relief areas, to ensure appropriate slack and following of bottom contours would ensure minimal disturbance in hard-bottom habitats. In any event, the disturbance or destruction of localized individuals within a much larger community would not represent a significant impact on the community, and recolonization and recovery of these "patches" would occur as a result of natural processes (Lissner et al. 1991). Similar impacts on hard bottom organisms could occur during cable removal activities, particularly if colonization by sensitive species occurs on the cable and/or the cable is effectively "cemented" to the natural substrate by encrusting species. In these cases impacts would occur to colonizing species and/or the substrate, but would be localized to the cable and immediately adjacent areas. Therefore, impacts on hard-bottom communities would be adverse but less than significant (Class III).

Extensive alteration or destruction of habitat or communities lasting more than 1 year would not occur. This is because of the small size of the cable (approximately 1 inch or 28 mm), the very localized plow corridor that is achievable using the specified Project methods (Section 2.2), and burial along most (76-80 percent) of the route, depending on whether partial burial is attempted in low- to no-relief hard substrate areas that could result in sidecast berms (see above). The plow limits the disturbed area in soft-bottom habitats to narrow (about 6 feet; ~2-m wide) swaths and the approximately 4 inches wide by 3 feet deep (0.1-m wide by 1-m deep) trench that would be refilled as the cable is installed (Section 2.2).

Impacts on Soft-bottom Habitats

Impacts on soft-bottom communities would be short term and not significant due to the extremely small percentage of habitat that would be affected by either installation or decommissioning activities and the typically rapid recolonization and recovery of these communities to minor disturbance (USEPA 1993). Therefore, impacts on these communities would be adverse but less than significant (Class III). Potential changes due to sidecast berms in relatively harder “soft” substrate are unlikely to cause adverse long-term effects, and might be beneficial.

Temporary displacement of some fishes from the immediate vicinity to distances of hundreds of feet (tens of meters) of the cable route would occur during short-term (minutes) passage of grapnels and cable-installation or decommissioning equipment. However, the impacts would be temporary (a few hours) and localized (occurring over a very discrete area), as noted below, and therefore not significant (Class III).

No substantive plant habitats, such as kelp, eelgrass, or algae, occur along the sea route, so there would be no impacts on these resources from the Project.

The extent and concentrations of suspended solids in the plume resulting from cable burial by the plow or removal during decommissioning would vary depending on the type of sediment and bottom currents that would serve to transport and disperse the material following the disturbance. However, potential impacts on soft-bottom species from this turbidity would be localized and short term and therefore less than significant (Class III). This is because bottom disturbance from the plow or removal equipment is not expected to exceed episodic natural events to which these organisms are exposed, and/or levels of turbidity that have been shown to cause significant impacts on a variety of invertebrates and fishes (Auld and Schubel 1978, Day et al. 1989, Mearns 1977, Moore and Mearns 1980, Newcombe and MacDonald 1991, and Schubel et al. 1977). Turbidity would not be a factor in hard-bottom habitats since burial would not occur and because the plume from plowing or decommissioning in adjacent soft-bottom areas is expected to generally disperse prior to reaching these areas. Regardless, the concentrations near the plow or removal equipment are still unlikely to exceed concentrations noted above as causing potential impacts on marine organisms.

Implementation of proposed Project methods (Section 2) would ensure that significant impacts do not occur. Based on these collective conclusions, direct comparisons with the significance criteria demonstrate that impacts on invertebrates, fishes, and plants/algae from the Project would not be significant (Class III), and no mitigation is required. This is because the following impacts would be avoided or minimized:

- Any substantial loss or degradation to the functional habitat value of any area of biological significance that cannot recover within 1 year of Project completion is significant (adverse impacts would be localized and temporary, less than 1 year).
- Any substantial impedance of fish or wildlife migration or passage routes that lasts for more than 48 hours (construction and decommissioning equipment would be present only for minutes to a few hours in any particular area and and installation or removal would not produce changes in substrate or environmental conditions that would be of a scale or intensity to restrict migration or passage).
- Any substantial alteration or destruction of habitat that prevents reestablishment of biologically significant communities that inhabited the area prior to the Project is significant (soft-bottom habitats would recover within a year or less, in hard-bottom habitats the cable would be surface laid and eventually would be removed as carefully as feasible to avoid substantial damage, and any sidecast berms in partial burial areas would produce a somewhat different habitat but one that should be neutral at worst or beneficial at best).
- Extensive alteration or loss of biological communities in high-quality habitat, such as high-relief hard bottom and areas with colonial corals and large sponges, that lasts longer than 1 year (construction methods including surface laying, avoidance of bottom contact by the plow and grapnels in hard-bottom habitats, and careful decommissioning methods would avoid extensive alteration or loss).
- Any substantial loss or disturbance of a population of a threatened, endangered, or candidate species or its habitat (special status invertebrate or fish species are not known to occur along the sea route, with the possible exception of boccacio, but disturbance to fishes including these species would be much less than significant).

Essential Fish Habitat

Impacts on EFH species are described in detail in Appendix D.1 and have been independently reviewed by SAIC (D. Heilprin) for this EIR/EIS. Based on the definition for adverse effect, as provided in NOAA Fisheries Guidance Document, no reduction in quality and/or quantity of EFH is likely. Minimal short-term impacts on benthic biota will occur based on cable laying or decommissioning methods and HDD activities, as described above, but these communities will reestablish to near pre-construction or removal levels within the first year following construction. Direct impacts on fish communities managed under the three Pacific FMPs will not occur. Fish will most likely compensate for short-term impacts on feeding grounds during construction or decommissioning, and resume normal activities in a short period of time. No sensitive nursery areas are to be crossed by the cable route and thus no reduction in population yields are expected. Therefore no significant impacts on EFH are expected (Class III).

Marine Mammals

Potential impacts on marine mammals that could occur during cable laying operations include entanglement with the cable or other lines, collision with the cable lay vessel or support vessels, noise and disturbance from the cable laying operations, and contact with oil from a fuel spill. Marine mammals also could be subjected to similar impacts during cable repair and cable removal operations. As noted in Section 2.4, the Applicant has committed to implementing a number of measures during installation of the cable to protect marine mammals and other sensitive resources.

Impact MBR-2: Entanglement of Marine Mammals in the Cable or Other Lines

It is possible that a marine mammal could become entangled in the cable or other lines, such as the plow tow rope, during cable laying installations. (Class III)

No entanglement of marine mammals has been documented during other cable laying operations. Most marine mammals tend to avoid vessels and areas of human activity and thus would be unlikely to approach the area close enough to become entangled. Harvey (2004) notes that during 2,259 hours of observing cable placement activities off Morro Bay, California, in 2001, only three large whales came within 328 feet (100 m) of a cable lay vessel. Potential impacts on marine mammals from cable or line entanglement during cable installation would be reduced by protective measures included in the Project description (Section 2.4). NOAA Fisheries-approved marine mammal monitors will be present during cable laying activities to ensure that any marine mammal entering the established (minimum) 500-foot (152-m) safety zone is sighted. If marine mammals are sighted within the established safety zone, operations will be delayed until they move out of the area. With these protective measures, the chance of a marine mammal becoming entangled in a cable or line during cable installation is negligible (Class III).

Impact MBR-3: Collision with a Marine Mammal

A marine mammal could be killed or injured by collision with the cable lay vessel or a support vessel. (Class III)

As described in Section 4.7, during cable installation, four project-related vessels would be operating in the project area. An average of about three California sea lions and three harbor seals are killed or injured by boat collisions in California each year (Carretta et al. 2004). One or more baleen whales may be injured or killed by vessel collisions in a year. Odontocetes (toothed whales) rarely are reported as victims of ship strikes. Because of the low level of vessel traffic associated with the cable installation operations, the short duration of offshore activities (up to 2 weeks), and the slow speed at which the lay vessel will be moving, a collision with a marine mammal during cable placement is unlikely. Furthermore, protective measures described in Section 2.4 would be implemented during cable installation to reduce the risk of impacts on marine mammals. These protective measures include the use of NOAA-fisheries approved marine mammal monitors with the authority to call for the curtailment of operations if a marine mammal enters a 500-ft (152 m) safety zone. Cable-laying vessel speed limits of generally less than 2 knots will be established and enforced. Smaller support vessels would also be required to maintain moderate speeds (3-5 knots) to minimize the likelihood of collisions. However, even with marine mammal monitors, a juvenile gray whale was apparently struck by the cable lay vessel's propellers during cable installation off Morro Bay (Harvey 2004). The encounter severed the whale calf's flukes and it is unlikely that the whale survived. Following the injury to the gray whale calf, a cable research report was produced that included recommendations from marine mammal monitors of additional measures to reduce the chances of injury to marine mammals during cable installation. With these protective measures, a collision between a vessel and a marine mammal during cable placement would be highly unlikely. Impacts would not be significant (Class III).

Impact MBR-4: Disturbance of Marine Mammals by Noise or Cable Lay Operations

Marine mammals may be disturbed by the noise and activity of the cable laying operations. (Class III)

Vessels are major contributors to overall background noise in the sea (Richardson et al. 1995). Sound levels and frequency characteristics are roughly related to ship size and speed. The dominant sound source is propeller cavitation. In general, pinnipeds and odontocetes tend to be tolerant of vessels. The exception is pinnipeds on land. Harbor seals, in particular, may move into the water in response to boats (Richardson et al. 1995). However, cable laying activities will occur well offshore so no impacts on pinniped haul-out areas would occur.

Avoidance of vessels by baleen whales appears to be related to the speed and direction of approaching vessels (Richardson et al. 1995). Whales often move away in response to strong or rapidly changing vessel noise, especially when a boat approaches directly. Gray whales have been observed to change course at a distance of 666-1000 ft (200-300 m) in order to move around a vessel in their path. On the other hand, some gray whales have not been observed to react until a ship is within 50 to 100 ft (15 to 30 m). Humpback whales have been observed to avoid vessels and change behavior when a boat approached within a half mile.

Based on the noise analysis in Section 4.8.4, cable-laying vessels would create underwater noise levels up to 160 dB. Plowing operations would cause the highest noise levels (around 185 dB). NOAA Fisheries has adopted 160 dB as an acceptable level of impulsive underwater sound. Based on available scientific evidence, acoustic harassment of marine mammals would not be expected to occur below this conservative level. The noise of the plow would be expected to attenuate to 160 dB at 100 ft (30 m) distance. Because a 500-foot (152-m) safety zone would be established by marine monitors, and operations would be delayed until marine mammals move out of the area, marine mammals would not be harassed. Therefore, a marine mammal would only be exposed to very high noise levels if it came extremely close to the plow.

In summary, marine mammals (especially baleen whales) may experience some temporary disturbance during cable installation. Some whales may alter their behavior to avoid the activities. However, vessel traffic is common in the project area and most marine mammals are adapted to it. The proposed cable installation would not be expected to alter the migration patterns of any marine mammals. Cable laying activities would occur for only up to 14 days. Therefore, any disturbance to marine mammals would be limited to a brief period. Protective measures incorporated into the Project (see Section 2.4) would further reduce impacts of noise and disturbance to marine mammals. As noted above, NOAA-Fisheries-approved marine monitors would be present during all activities and, if a marine mammal is observed to enter the 500-foot (152-m) safety zone, operations would be delayed until marine mammals move out of the area. Therefore, a marine mammal would be unlikely to be exposed to the full noise levels of the plow. Vessel operators will reduce or minimize propeller noise and other noises associated with cable laying activities to the extent possible. The cable lay vessel and support vessels would limit their speeds. With these protective measures, impacts of noise and disturbance from cable placement on marine mammals would be adverse but not significant (Class III).

Impact MBR-5: Harm to Marine Mammals by a Fuel Spill

An accidental release of fuel to the marine environment could harm marine mammals. (Class III)

There is a slight chance that another vessel could collide with the cable lay vessel and breach its fuel tanks, resulting in a release of fuel to the marine environment. The cable lay vessel carries about 1,956 cubic meters of heavy fuel and an additional 164 cubic meters of gas and oil. Oil released to the marine environment has the potential to cause significant adverse impacts on marine mammals.

Oil may affect marine mammals through surface contact, oil inhalation, oil ingestion, and baleen fouling (MMS 2001). Cetaceans risk a number of toxic effects from oil, but, in general, mortality of cetaceans has not been observed in oil spills. Because oil can destroy the insulating qualities of hair or fur, resulting in hypothermia, marine mammals that depend on hair or fur for insulation are most likely to suffer mortality from exposure to oil. These vulnerable animals would include fur seals, harbor seal pups, which lack a fat insulating layer and rely on a dense fur (lanago) coat for thermal protection, and sea otters. If oil from a fuel spill were carried inshore, especially into Elkhorn Slough, and contacted harbor seal pupping areas or concentrations of sea otters, mortality of a number of individuals of these species would be likely. However, the potential risk of a vessel collision is very low, as described in the marine vessel transportation analysis, Section 4.7. The Cable Act of 1992 (47 CFR §76) states that other vessels must maintain a 1.15 miles (1 nm) separation from a vessel laying or repairing an undersea cable. In addition, the Applicant would issue a notice to mariners of the proposed cable-laying activities. The cable lay vessel, the *Ile de Ré*, also has a Spill Prevention Control and Countermeasure Plan that would be implemented in the event of a leak. The Office of Spill Prevention and Response has reviewed and approved the spill response plan for this Project. With the protective measures required to prevent a collision and implementation of the Spill Prevention Control and Countermeasure Plan, a fuel spill from the cable lay vessel on marine mammals would be adverse but not significant (Class III).

Impact MBR-6: Harm to Marine Mammals during Project Operation and Cable Repair

Marine mammals could become entangled in the cable during repair operations. (Class III)

After the cable has been laid, the potential impacts on marine mammals would be disturbance and entanglement during cable repair. The scientific instruments that are anticipated for deployment in the cabled observatory would be passive and would not emit sound to the marine environment. The science node has been designed to allow repairs without disturbing the cable.

The long-term presence of the cable on the bottom would not significantly impede marine mammal migration since it would be buried along most (76.5 percent) of the route and represent a very low profile (1 to several inches) in hard-bottom areas as a result of careful installation and post-lay inspection/adjustment of the cable in these areas (Section 2). Where hard-bottom areas are encountered, the cable route would be diverted around specific features whenever feasible. If the cable cannot be buried, slack would be stabilized at a level within the range of 2 to 3 percent to ensure that the cable conforms to the slopes and peaks of the seabed so that it is not suspended substantially (more than 1 foot) above the bottom (see Section 2). This would prevent any spans from developing that could potentially impact marine mammals, such as whales, in the area.

Harvey (2004) cites 13 reports of sperm whales that became entangled in underwater cables and one report of cable entanglement by a humpback whale. All or these reported entanglements apparently occurred prior to the early 1960s. Some of the early entanglement problems, as suggested by repair records, show that the cable was treated very casually after a repair and large loops of slack cable were typically present at the site of a previous repair. Careful installation of the cable and post-lay inspection and reorientation as needed would be conducted as a key part of the Project methods.

With development of modern technologies to bury the cable (sea plows), undersea telephone cables are plowed into the seabed in water depths to 600 fathoms (3,600 feet). Previously, torque in the cable that would produce large standing loops in the cable when at low tension on the seabed could cause potential marine mammal entanglement. However, modern improvements in cable design and handling have reduced this torque. Also, post-repair operations now use divers in shallow waters and ROVs in deeper water depths to rebury the cable into the seabed, close to its original position. Because most of the cable will be buried, and unburied portions will be installed carefully to prevent spans of cable that could entangle marine mammals, impacts on marine mammals of cable entanglement would not be significant (Class III).

Cable repair operations would briefly expose marine mammals to noise and disturbance from work vessels. Potential impacts would be similar to those discussed above for cable installation, but repair operations would likely take no more than a day and only the damaged segment of cable would be exposed. Impacts on marine mammals of cable repair would not be significant (Class III).

Seabirds

Impact MBR-7: Disturbance to Seabirds during Cable Lay Operations

Seabirds in the vicinity of the cable laying or repair operations may experience some disturbance by the vessels and activities. (Class III)

Disturbance is an issue for seabirds when activities occur near nesting colonies. The proposed cable laying would be offshore and would not disturb any seabird nesting colonies. Some seabirds may avoid the immediate vicinity of the cable laying operations and some birds sitting on the water may move out of the way of construction vessels. Temporary displacement from a limited area over a period of up to 14 days would have a less than significant impact on seabirds (Class III).

Cable repair operations could disturb seabirds for short periods of time, likely less than a day and only in the vicinity of the damaged segment of cable. Impacts on seabirds from cable repair operations would not be significant (Class III).

Impact MBR-8: Harm to Seabirds by a Fuel Spill

An accidental release of fuel to the marine environment could harm seabirds and shorebirds. (Class III)

The only potentially substantial impact on seabirds and shorebirds from the Project would be if a vessel collision resulted in breaching of the fuel tank of the lay vessel and subsequent release of fuel to the marine environment. Large oil spills typically have resulted in the oiling of large numbers of seabirds. Spilled oil may affect birds in several ways including direct contact with floating or beached oil, toxic reactions, loss of habitat; and loss of prey (MMS 2001). Birds that spend much of their time feeding or resting on the surface of the water, such as surf scoters and common murres, tend to be most vulnerable to oil spills. Shorebirds could suffer loss of critical foraging habitat if oil came ashore and fouled beaches. As discussed above and in Section 4.7, the Cable Act requires other vessels to maintain a 1.15 miles (1 nm) separation from the cable-laying vessel. Also, the cable lay vessel has an approved Spill Prevention Control and Countermeasure Plan. Because of the protective measures in place, potential impacts on seabirds and shorebirds from a fuel spill during cable laying operations would be adverse but not significant (Class III).

Sensitive Habitats and Species

Impact MBR-9: Harm and Disturbance to Sensitive Species during Cable Lay Operations

Marine mammals and seabirds listed as endangered or threatened could be entangled in the cable, harmed by the cable lay vessel or support vessel, or otherwise disturbed by cable lay operations. (Class III)

Federal endangered whales that occur in the project area include blue whale, fin whale, sei whale, humpback whale, Pacific right whale, and sperm whale. Potential impacts on marine mammals include entanglement with the cable or other lines, collision with the cable lay vessel or support vessels, noise and disturbance from the cable laying operations, and contact with oil from a fuel spill; these impacts are discussed above. As discussed above and listed in Section 2.4, the Applicant has committed to implementing a number of environmentally protective measures to protect marine mammals during installation of the cable; this would reduce impacts on endangered whales to a less than significant level (Class III). Two listed pinnipeds, the federal threatened Stellar sea lion and the Federal and State threatened Guadalupe fur seal, may occur in the project area. The proposed cable laying operations would not occur in the vicinity of haul-out sites for these species and impacts would not be significant (Class III).

The southern sea otter is most common in shallow waters inshore of the areas where cable laying would occur but may be present along the inshore portions of the cable route. Otters might be impacted by noise and disturbance of the cable-laying operations, by a vessel collision, or by a fuel spill.

Sea otters appear to be relatively tolerant of vessel activity (Richardson et al. 1995). Sea otters often allow close approaches by boats, but sometimes avoid heavily disturbed areas. Sea otters appear to be tolerant of loud underwater noises; when monitored during a seismic survey, sea otters showed no disturbance reactions when a full-scale seismic ship passed as close as 0.5 mile (0.9 km) (Richardson et al. 1995). Feeding otters continued to dive and feed successfully at these times. No reactions were evident among otters that were rafting, grooming, swimming, mating, or interacting with pups. Therefore, noise and disturbance to sea otters during the up to 14 days when cable placement activities would be taking place would not be a significant impact (Class III).

Sea otters may be hit by vessels during cable-placement activities. Fast-moving support vessels would be more likely to strike a sea otter than the slow moving cable lay vessel. Harvey (2004) notes that sea otters have been killed by strikes of fast moving vessels off Elkhorn Slough. The Applicant has committed to protective measures to avoid impacts on marine mammals and other sensitive species during cable placement (Section 2.4). These measures include a requirement that support vessels maintain moderate speeds of 3 to 5 knots to minimize the likelihood of collisions. With implementation of this protective measure, impacts on sea otters from vessel collisions would be not be significant (Class III).

In the unlikely event of a collision involving breaching of the fuel tanks of the cable-lay vessel and subsequent release of oil, sea otters could be injured by oiling. Sea otters, which rely on maintaining a layer of warm, dry air in their underfur for thermal protection, are among the most sensitive marine mammals to the effects of oil contamination (MMS 2001). Even partial fouling of an otter’s fur can be lethal. Large numbers of sea otters were killed by the *Exxon Valdez* spill (USFWS 2003). A spill from the cable lay vessel could have particularly severe effects on sea otters if oil entered Elkhorn Slough, where 60 to 90 otters typically congregate. However, as discussed above and in Section 4.7, the Cable Act requires other vessels to maintain a 1.15 miles (1 nm) separation from the cable-laying vessel. Also, the cable lay vessel has an approved Spill Prevention Control and Countermeasure Plan. Because of the protective measures in place, potential impacts from an oil spill to sea otters would not be significant (Class III).

Sensitive seabird species in the project area include California brown pelican, California least tern, marbled murrelet, and, on Moss Landing beaches and in Elkhorn Slough, western snowy plover. As discussed above for seabirds in general, the Project would have minimal impact on seabirds and shorebirds except in the unlikely event of a fuel spill. Individuals of all of these species could suffer damage in the event of a major fuel spill that spread out and covered a wide area, contacted Moss Landing beaches, and/or entered Elkhorn Slough. As discussed above, the potential for an oil spill from vessel collision is low. With implementation of the protective measures described above and in

Section 4.7, impacts of a fuel spill on seabirds and shorebirds would not be significant (Class III).

Invasive Species

Introduction or spread of invasive species due to the Project is highly unlikely along the sea route since known invasive species in the MBNMS are unlikely to occur in the habitats and/or depth ranges along the sea route. Therefore, no significant impacts are expected (Class III).

Landing Site

Invertebrates, Fishes, and Plants/Algae

Impact MBR-10: Damage to Nearshore Soft-Bottom Organisms and Habitat

Substrate and fragile organisms in nearshore areas could be damaged by the pre-lay grapnel run, cable installation, post-lay burial, or HDD. (Class III)

Potential impacts on biological resources in nearshore areas at the landing site would not be significant (Class III), for the same reasons as noted above for other soft-bottom areas that are subject to cable burial along the sea route. Adherence to the "Drilling Fluid Monitoring and Remediation Plan" (Appendix H) would also avoid or minimize any potential effects from loss of drilling fluids from fractures in the geologic formation.

Marine Mammals, Seabirds, and Shorebirds

Impact MBR-11: Marine Mammals, Seabirds, and Shorebirds Harmed by Accidental Release of Drilling Mud

An accidental release of drilling mud could degrade foraging habit for shorebirds and sea otters, and haul-out areas for harbor seals. (Class III)

HDD would be used to install an underground conduit for the cable from shore to about 50 ft (15 m) water depth offshore. The proposed staging area for HDD is a vacant lot at the end of Sandholt Road. The site would be accessed by road and no direct disturbance to marine mammals, seabirds, or shorebirds would occur. There is a slight potential that drilling muds could be released during HDD. In the worst case, if large amounts of drilling mud were released, it might come ashore on area beaches or in Elkhorn Slough and degrade foraging habitat for shorebirds or harbor seal haul-out areas. It could also settle on the sea floor and impede sea otter foraging. As discussed in Section 2.2.6 and Appendix H, during the HDD operation, the drill path will be constantly monitored for surface releases by an Environmental Monitor and communication between the monitoring vessel and the control cab would be maintained at all times. The monitors would be kept constantly informed of the progress of the drill head so as to be able to concentrate their search for any indications of an inadvertent release of drilling fluids. In the event of a subsurface release, divers equipped with specialized water lifts and filter bags would be used to remove bentonite from the sea floor. With implementation of these protective measures, impacts on marine mammals and shorebirds from an accidental drilling mud release during HDD would not be significant (Class III).

Sensitive Habitats and Species

Impact MBR-12: Sensitive Species Harmed by Accidental Release of Drilling Mud

An accidental release of drilling mud could degrade foraging areas for sea otters and western snowy plovers. (Class III)

As discussed above under impacts on marine mammals and seabirds at the landing site, no direct impacts on sensitive marine mammal or seabirds would be expected. There is a slight chance that there could be a release of drilling mud during HDD. In the highly unlikely worst case, the drilling mud could foul sea otter foraging areas in Elkhorn Slough and beaches used for foraging by western snowy plovers. Project area beaches and the Moss Landing Wildlife Area in Elkhorn Slough are designated Critical Habitat for snowy plover. Substantial degradation of habitat used by sea otters and snowy plovers would be a significant impact. However, as discussed above, in Section 2.2.6, and in Appendix H, the Applicant has committed to implement protective measures that would prevent significant adverse effects from a drilling mud release, including careful monitoring for surface releases of mud during the HDD process. With adherence to those protective measures, substantial releases of drilling mud and associated degradation of habitat used by sensitive species would be prevented or substantially reduced, so impacts on sea otters and snowy plovers would not be significant (Class III).

Invasive Species

Introduction or spread of invasive species due to the Project is highly unlikely at the landing site since planned methods, particularly HDD would avoid potential habitats and/or depth ranges where these species might occur. Therefore, no significant impacts are expected (Class III).

Table 4.5-1. Summary of Marine and Near-Coastal Biological Resources Impacts and Mitigation Measures

Impact	Mitigation Measures
MBR-1: During the pre-lay grapnel run, cable installation, post-lay burial, and decommissioning the substrate and fragile organisms could be dislodged or crushed. (Class III)	None required.
MBR-2: It is possible that a marine mammal could become entangled in the cable or other lines, such as the plow tow rope, during cable laying installations. (Class III)	None required.
MBR-3: A marine mammal could be killed or injured by collision with the cable lay vessel or a support vessel. (Class III)	None required.
MBR-4: Marine mammals may be disturbed by the noise and activity of the cable laying operations. (Class III)	None required.
MBR-5: An accidental release of fuel to the marine environment could harm marine mammals. (Class III)	None required.
MBR-6: Marine mammals could become entangled in the cable during repair operations. (Class III)	None required.
MBR-7: Seabirds in the vicinity of the cable laying or repair operations may experience some disturbance by the vessels and activities. (Class III)	None required.
MBR-8: An accidental release of fuel to the marine environment could harm seabirds and shorebirds. (Class III)	None required.
MBR-9: Marine mammals and seabirds listed as endangered or threatened could be entangled in the cable, harmed by the cable lay vessel or support vessel, or otherwise disturbed by cable lay operations. (Class III)	None required.
MBR-10: Substrate and fragile organisms in nearshore areas could be damaged by the pre-lay grapnel run, cable installation, post-lay burial, or HDD. (Class III)	None required.
MBR-11: An accidental release of drilling mud could degrade foraging habit for shorebirds and sea otters, and haul-out areas for harbor seals. (Class III)	None required.
MBR-12: An accidental release of drilling mud could degrade foraging areas for sea otters and western snowy plovers. (Class III)	None required.

4.5.5 Cumulative Impacts

The cumulative projects include harbor repairs, scientific research including deepwater test drilling, State Park facility repairs, dredged material disposal at a designated site (SF-12), and other ongoing marine research and fishing activities. Some impacts could occur to hard bottom benthic resources as a result of these activities, but are considered non-significant. Most of these projects are not within the area of potential disturbance from the proposed cable so disturbances would not overlap. The borehole project, which would be in the project area, would have the potential to disturb only extremely small sections of the seabed. Therefore, cumulative impacts from these projects and activities on marine and near-coastal biological resources would be less than significant (Class III).

4.5.6 Alternative Landings

Alternative Landing Area 1: Duke Energy Pipeline to MBARI Property

This alternative would involve HDD from the landing site (MBARI property) to the Duke Energy Pipeline across the entrance to Moss Landing Harbor on Moss Landing State Park property (Section 2). Biological resources at this landing site would be similar to those at the proposed landing site. Since the project methods would be very similar, the potential impacts of Alternative Landing Area 1 on marine and near-coastal biological resources would be very similar to the proposed Project.

Alternative Landing Area 2: Moss Landing Marine Laboratories (MLML) Pier

This alternative would involve landing the cable at the Moss Landing Marine Laboratory Pier that is scheduled for construction in 2005. Biological resources at this landing site would be similar to those at the proposed landing site and Alternative Landing Area 1. Since the installation methods that could affect marine species would be similar to the proposed Project, potential impacts would be very similar to those of the proposed Project. However, impacts associated with HDD would not occur. In addition, some benthic disturbance in the vicinity of the new MLML Pier from dredged material disposal could occur. However, this would be temporary and localized, depending on the volume of dredged material being discharged and considered non-significant (Class III).

No Project/Action Alternative

This alternative would have no impacts on any marine or near-coastal biological resources beyond those that are present under current operations.